

AMENDMENTS TO THE CLAIMS

Please amend the pending claims as follows:

1. (currently amended) A hydrofluoric acid wastewater treatment method, comprising the following steps:

a hydrofluoric acid concentration step comprising concentrating hydrofluoric acid wastewater by evaporation to produce a concentrated hydrofluoric acid water and a hydrofluoric acid-containing vapor;

a dissolution step comprising bringing the hydrofluoric acid-containing vapor obtained in the hydrofluoric acid concentration step into contact with dissolution water to dissolve the vapor;

a neutralization step comprising bringing the residual hydrofluoric acid-containing vapor which has not been dissolved in the dissolution water and remains undissolved in ~~left from~~ the dissolution step into contact with an alkali to produce a neutralized liquid and a dehydrofluorinated vapor; and

a condensation step comprising condensing the dehydrofluorinated vapor obtained in the neutralization step to produce condensed water.

2. (original) A method according to claim 1 further comprising a neutralized liquid separation step comprising separating the neutralized liquid obtained in the neutralization step into hydrofluoric acid-containing water, alkali-containing water and desalinated water using ion exchange membranes.

3. (original) A method according to claim 1 further comprising:

a neutralized liquid concentration step comprising bringing the condensed water obtained in the condensation step into contact with an alkali and/or bringing the dehydrofluorinated vapor before condensation in the condensation step into contact with an alkali to produce a neutralized liquid, followed by concentrating the neutralized liquid by evaporation to produce a concentrated neutralized liquid and a re-dehydrofluorinated vapor; and

a concentrated neutralized liquid separation step comprising separating the concentrated neutralized liquid obtained in the neutralized liquid concentration step into hydrofluoric acid-containing water, alkali-containing water and desalinated water using ion exchange membranes.

4. (original) A method according to claim 1, wherein the hydrofluoric acid concentration step further comprises concentrating by evaporation the hydrofluoric acid-containing vapor solution obtained in the dissolution step.

5. (currently amended) A hydrofluoric acid wastewater treatment method comprising the following steps:

a first concentration step comprising concentrating hydrofluoric acid wastewater by evaporation to produce a concentrated hydrofluoric acid water and a hydrofluoric acid-containing vapor;

a neutralization-condensation step comprising neutralizing with an alkali and condensing the hydrofluoric acid-containing vapor obtained in the first concentration step to produce a neutralized liquid;

a second concentration step comprising concentrating the neutralized liquid obtained in the neutralization-condensation step to produce a concentrated neutralized liquid; and

a separation step comprising separating the concentrated neutralized liquid obtained in the second concentration step into hydrofluoric acid-containing water, alkali-containing water and desalinated water using ion exchange membranes.

6. (currently amended) A hydrofluoric acid wastewater treatment device for treating wastewater containing hydrofluoric acid, comprising:

a hydrofluoric acid concentrator for concentrating hydrofluoric acid wastewater by evaporation to produce a concentrated hydrofluoric acid water and a hydrofluoric acid-containing vapor;

a water contactor for bringing the hydrofluoric acid-containing vapor obtained by the concentrator into contact with dissolution water to dissolve the vapor;

a hydrofluoric acid vapor supply line for supplying the hydrofluoric acid-containing vapor from the hydrofluoric acid concentrator to the water contactor;

an alkali contactor for bringing the residual hydrofluoric acid-containing vapor which has not been dissolved in the dissolution water and remains undissolved in ~~left from~~ the water contactor into contact with an alkali to produce a neutralized liquid and a dehydrofluorinated vapor; and

a condenser for condensing the dehydrofluorinated vapor obtained by the alkali contactor to produce condensed water.

7. (original) A hydrofluoric acid wastewater treatment device according to claim 6 further comprising a separator for separating the neutralized liquid obtained by the alkali contactor into hydrofluoric acid-containing water, alkali-containing water and desalted water using ion exchange membranes.

8. (original) A hydrofluoric acid wastewater treatment device according to claim 7 further comprising a neutralization-concentration apparatus for bringing the condensed water obtained by the condenser into contact with an alkali and/or bringing the dehydrofluorinated vapor before condensation in the condenser into contact with an alkali to produce a neutralized liquid, and concentrating the neutralized liquid by evaporation to produce a concentrated neutralized liquid and a re-dehydrofluorinated vapor;

the separator being configured to separate the concentrated neutralized liquid obtained by the neutralization-concentration apparatus and the neutralized liquid obtained by the alkali contactor together into hydrofluoric acid-containing water, alkali-containing water and desalted water using ion exchange membranes.

9. (currently amended) A hydrofluoric acid wastewater treatment device for treating wastewater containing hydrofluoric acid, comprising:

a first concentrator for concentrating hydrofluoric acid wastewater by evaporation to produce a concentrated hydrofluoric acid water and a hydrofluoric acid-containing vapor;

a condenser for condensing the hydrofluoric acid-containing vapor obtained by the first concentrator to produce a condensate;

~~a neutralizer and condenser for neutralizing with an alkali and condensing the hydrofluoric acid-containing vapor obtained by the first condenser or the condensate to produce a neutralized liquid;~~

~~a second concentrator for concentrating the neutralized liquid obtained by the neutralizer and condenser to produce a concentrated neutralized liquid;~~

~~a separator for separating the concentrated neutralized liquid obtained by the second concentrator into hydrofluoric acid-containing water, alkali-containing water and desalted water using ion exchange membranes;~~

~~a vapor supply line for supplying the hydrofluoric acid-containing vapor from the first concentrator to the condenser;~~

Appl. No. : 10/722,990
Filed : November 26, 2003

a condensate outlet line for supplying the condensate from the condenser to the second concentrator; and

an alkali supply line for supplying alkali from the neutralizer to at least one of the vapor supply line, condenser, condensed water outlet line, and second concentrator.

10. (new) A hydrofluoric acid wastewater treatment device for treating wastewater containing hydrofluoric acid, comprising:

a hydrofluoric acid concentrator for concentrating hydrofluoric acid wastewater by evaporation to produce a concentrated hydrofluoric acid water and a hydrofluoric acid-containing vapor;

a water contactor configured to receive the hydrofluoric acid-containing vapor from the concentrator and bring the hydrofluoric acid-containing vapor into contact with dissolution water to dissolve the vapor;

an alkali contactor for bringing the residual hydrofluoric acid-containing vapor that has not been dissolved in the dissolution water and remains undissolved in the water contactor into contact with an alkali to produce a neutralized liquid and a dehydrofluorinated vapor; and

a condenser for condensing the dehydrofluorinated vapor obtained by the alkali contactor to produce condensed water.

11. (new) A hydrofluoric acid wastewater treatment device according to claim 6 which further comprises a return line for supplying the hydrofluoric acid-containing vapor solution from the water contactor to the hydrofluoric acid concentrator.